An Analysis of the State and Prospects of e-Learning in Developing Countries

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Abstract: E-learning and distance learning are standard modes of education in today’s European and American educational institutions, and they have been marketed as a solution to Africa’s education needs, too. This study investigated the challenges and possibilities related to the development of distance education in a developing country context. We outline the distance education needs in developing countries, as well as some of the related challenges. We report the results of a qualitative study, in which our informants were IT and education experts in developing countries. Even though we found a number of pedagogical, technical, and environmental aspects need to be taken into consideration, our results support the view that e-learning and distance education indeed offer promising new directions for education in developing countries. Our research showed that distance education was regarded as especially promising in respect to post-graduate education, sustaining competence, and completion of degrees. On the negative side, there was a worry about the decreasing number of jobs.

Keywords: Distance education, e-learning, ICT education in developing countries

1. Introduction

E-learning has been proposed as a solution to a variety of educational problems, such as shortage of teachers, lack of quality material, inclusion of part-time students and adult education students, and long geographical distances. For quite some time, e-learning solutions have been marketed as a solution to developing countries’ educational problems, too. Until recently, however, developing countries have not had the same infrastructural and technological capabilities than industrialized countries have. Currently a number of countries in Sub-Saharan Africa are installing countrywide Internet backbone cables, coupled with a variety of wireless last-mile solutions. In this study we explored current challenges and prospects of e-learning solutions in several Sub-Saharan African countries.

In this study we wanted to investigate the challenges and possibilities related to the development of information and communication technology (ICT)-based distance education in a developing country context. Instead of a wide survey we outline a deep qualitative insight in the e-learning needs in developing countries, as well as some of the related challenges expressed by a number of IT and education experts from Sub-Saharan Africa.

Firstly, we examined whether e-learning and distance education by using electronic equipment are practicable solutions in today’s Sub-Saharan Africa. E-learning offers many potential advantages compared to traditional classroom education. For example, in
developing countries the distances between students and teachers can sometimes be dozens of kilometres and very hard to travel. To offer a multiperspectival view of the phenomenon, we considered challenges like this vis-à-vis the opportunities that e-learning offers.

Secondly, we investigated whether web-based e-learning could realistically offer wider opportunities for education in Sub-Saharan Africa. The prospects that we examined were, for example, continuing interrupted studies and enrolling in adult education, and again we investigated the opportunities of e-learning in overcoming those challenges. We also define a set of challenges affecting the development of e-learning. Our standpoint for the investigation was that technology should not be a value per se, but technology offers tools that can support various pedagogical models and choices.

Thirdly, we analyzed the possible effects of distance education to developing countries’ education. In that regard, we also considered the prerequisites and preconditions that must be at place when developing e-learning in developing countries, and we investigated some directions of development of e-learning.

1.1 E-learning and Distance Learning

*E-learning* refers to teaching and studying in virtual learning environments. As the mechanisms of education and learning are unique in virtual learning environments, pedagogical choices have to be aligned with virtual learning. It is often a good idea to not view traditional and e-learning pedagogy as separate, unconnected entities, but rather create an interplay of network thinking, available tools, and pedagogical approaches [13].

*Distance learning* refers to a learning setting where students and teachers are not at the same place at the same time. Due to the geographical distance involved, special attention has to be paid to ensure that teaching is systematic and planned. The most important characteristic in distance education is interaction. In addition to printed text, one can use various ICT-based solutions in distance learning, such as audio tracks, image files, video clips, synchronous video, and videoconferencing [14].

Nowadays the Internet makes available a variety of free learning objects, such as software, learning material, and modelling tools. In addition, Internet makes sharing of material possible regardless of one’s geographic location [15]. Web 2.0 tools, such as blogs, wikis, podcasts, and various virtual learning environments, offer more and more versatile possibilities to e-learning [1, 5]. Today some of the most common distance learning technologies are video conferences and various virtual learning environments, such as Moodle, WebCT, and Blackboard. Podcasting (Internet-based broadcasting of audio clips) and vodcasting (Internet-based broadcasting of video clips) are also becoming common. In addition, an increasing number of institutions are experimenting on education in virtual worlds, such as Second Life.

1.2 Earlier Research on Learning Technology in Developing Countries

Technology-oriented projects in developing countries require one to understand a variety of contextual, non-obvious nuances that are not an issue in similar projects in industrialized countries [19]. Brewer et al. [4] have outlined, in their work, a number of challenges related to technological projects in a developing country context. They grouped those challenges in three categories: cultural, technological, and environmental challenges. Each category is important for the success of the project [4].

Similar, Tedre et al. [17] have discussed the challenges of e-learning, with a focus on higher education. They argue that implementation of e-learning in a developing country context is a long process that requires a lot of resources. Tedre et al. note, for example, that students must have an easy access and chance to use the virtual materials, that university students must first learn the basic IT skills in order to utilize e-learning techniques, and that
teachers needs to be educated in appropriate presentation technologies for supporting their lectures. Tedre et al. also argue that even if there is technical and pedagogical know-how about virtual pedagogy in higher education, a number of other challenges are to be expected [10, 17]. It is expected that social and technical questions and challenges arise during the development of e-learning in a new environment. The challenges of e-learning, according to Tedre et al. [17] are illustrated in Figure 1. Figure 1 groups the challenges of e-learning in developing countries in six categories: pedagogical issues, funding, staff training, system administration, networks, and equipment.

![Figure 1: Challenges of e-Learning in Developing Countries [17].](image)

Unwin [18] emphasizes the importance of teacher education in Africa. Without well-educated and motivated teachers it is impossible to build workable school institutions. He presents a number of aspects on how to use ICT in teacher education. ICT is not usually the cheapest alternative for education, but helps to create new types of learning environments. Unwin argues that ICT plays a significant role in developing new educational resources. ICT and distance learning offer some prospects for improving Africa’s educational sector, and for finding some solutions to the current crisis of Africa’s education sector.

Until recently, the lack of Internet connectivity and the wide-open digital divide have greatly limited e-learning possibilities in Sub-Saharan Africa, and until recently there seemed to be few solutions [e.g., 9] However, in 2009-2010 there were a number of improvements in a number of Sub-Saharan countries. Before 2009 Internet connections in Tanzania were solely satellite-based—slow and expensive—but in 2009 and 2010 the SEACOM and EASSy submarine cables landed in cities like Mogadishu, Mombasa, Dar es Salaam, and Maputo. Although there are an increasing number of Internet users in Sub-Saharan Africa, equipment and connection prices keep them the privilege of few.

While the pedagogical and IT literacy issues are important for the success of e-learning, technical issues are crucial, too. One oft-overlooked issue in technical projects in developing countries are the environmental issues. Heat, dust, humidity, and temperature changes can damage computers and equipment, because most of the equipment is designed for the typical conditions and temperatures of industrialized countries [10]. And when
computers do break, broken computers can be very hard to fix because service might be located hundreds of kilometres away [16].

Industrial countries’ curricula and course materials have been considered to play an important role in enhancing education in developing countries [e.g., 9, 12, 20]. For example, the World Bank has supported the African virtual university to offer African universities academic courses in a number of fields. However, those courses have proved too expensive for regular citizens, and hence their use is largely restricted to select few. In addition, it is not sure if an imported curriculum can really deliver for developing countries what they need [16].

2. Methodology

This research follows the research process outlined by Bernard [2]. Bernard described the research process through four main steps: Formulation of a theoretical question, selection of appropriate site and methods, data collection and analysis, and a theoretical analysis and proposition [2]. This research employed qualitative research methods [8]—more specifically, a qualitative case study [21]. The focus of this research was an analysis of ICT-based distance education in developing countries. Data was collected through semi-structured interviews. In order to design the interviews, we examined what the research literature writes about the challenges and possibilities of distance learning and e-learning in industrialized countries as well as in developing countries.

The interviewees were selected through purposive sampling. A purposive sample makes it possible to obtain deep knowledge about the research topic, and it fitted well on the qualitative nature of our research [2]. We aimed at identifying at least five and no more than ten interviewees, and found seven interviewees who were experienced in terms of distance education in developing countries, and hence we involved students, teachers, and technical experts. Each interviewee was experienced in some aspects of organizing e-learning in developing countries. Second, each interviewee had also experience in distance education as a student or teacher. Six of the interviewees were from developing countries: three Tanzanias, one Mozambican, one Namibian, and one Nepalese, and one of them was a European long-term expert in a non-governmental organization that worked with development projects in Tanzania. Each of the interviewees were knowledgeable about e-learning in Sub-Saharan Africa. Each interviewee was attached to an academic institution, and each of them reported that they had done a part of their studies or teaching using some form of distance learning. By selecting a diverse group of informants, we aimed at ensuring that we can build a rich description from multiple perspectives.

During the interviews, interviewees filled up a questionnaire that consisted of statements about the challenges of distance education. The interviewees had to state their level of agreement (on a five-point Likert scale) with those statements. While each interviewee was filling up the questionnaire, we discussed the questionnaire statements with them. Thus, each interviewee was essentially thinking aloud why he or she chose that number. Thinking aloud is a data collection method, which aims at validating the answers and at giving an opportunity to explain answers more [3]. Each interview lasted approximately one hour, and the interviews were transcribed to text.

After the transcription, data was processed by using Atlas.Ti software. The analysis included organizing, accounting for, and explaining parts, focusing especially on categorizing the interviews to themes [6, 7]. After the empirical part of the research, at the fourth stage of research [2], we compared earlier research studies to the findings of this research, and we evaluated the validity of this research study.
3. Results

We first examined the possible changes that the experts would hope to see from computer-based distance education in developing countries’ schools. The interviewees saw a good number of development possibilities; the most commonly mentioned ones were reducing large class sizes, helping the severe lack of teachers, offering time and cost savings, reducing the need for printed books (which wear out easily), and the possibility for continuing education. Interviewees also noted that when distance education is well organized, it offers a possibility for studies for groups of people who previously have not had the chance to educate themselves.

“For example one friend of mine [...] He [had] already graduated [with a] bachelor degree. But some time after graduating he got a job [...] And he had to get the job.

But he really like to go studies [...] for the Master’s degree. And he tried to find both: Working and get his master’s. In Tanzania he didn’t find relevant university for he liked to get his masters. So, he started [at] one of the universities in USA. He started there online [...] E-learning [...] When he started he was working in Tanzania and took some courses there. And after some years he graduated!”

(Tanzanian male, 25.)

Interviews showed that the possibility of studying from home opens up a wide array of opportunities. Up-to-date information was seen as an important factor and as a significant advantage in one’s studies. Another advantage of distance education that our interviewees considered was shared knowledge and networking. Regarding the variety of courses, the interviewees believed that although the current selection of courses is limited, the selection will become wider once distance education becomes more common. The interviewees considered video conferencing to be, in their opinion, the most promising technology, due to the fact that it does not kill social interaction. The interviewees hoped that through development of educational technology, equal possibility for education might happen one day. As the negative effects of e-learning and distance learning, the interviewees mentioned loss of teaching jobs and addiction to technology.

Earlier research studies have emphasized the prospects of e-learning and distance education more than our interviewed experts did. Our interviewees considered distance education and e-learning important only when it really gives some additional value to education. Such situations were considered to be, for example, continuing education, post-graduate education, and teacher training for secondary or primary school teachers.

“Primary school teachers. [...] They have two years teacher training course and then they go to schools to work. [...] Sometimes [...] they don’t have schools near [their work place] to continue to study. [...] Then what government is fighting [to do for the teachers in such situation, is that the government decided] to launch distance teacher training course to continue to improve the skills of this teachers. [...] And they have an opportunity to continue to study even if they are far. This is important!”

(Mozambican male, 42.)

We continued to investigate what kinds of things do the experts consider to be crucial when implementing distance / e-learning programs in a developing country: We found a number of considerations that can also be found in the literature on the topic, and we considered them to fall naturally into three groups: appropriate technical interventions, locally viable pedagogical solutions, and relevance of the e-learning initiative to the local environment of the users (Figure 2).
According to the interviewees, the foremost technical challenges were to make distance learning hardware and software to work reliably, robustly, predictably, and effectively. Cooperation between countries was considered very important:

“Given current situation...they still have to borrow a lot of technology and knowledge from countries which have already practice of this kind of distance learning. ... If I try to imagine that Tanzania should develop their own system... They definitely need to get co-operative with other countries which have this kind of distance learning system already working...”

(Tanzanian male)

The most important user environment-related challenge was contextualization of software and hardware for developing counties. Those contextualization efforts include modifying the hardware and configuring the software to sustain the environmental effects, as well as translating the program interfaces and operating system to the countries’ native languages. Contextual understanding was considered to be important:

“So I think it is good idea. They [industrialized countries] can make interface but actually they have to see how people taking this. How this things really [has to solve] that problem. First of all they [people from industrialized countries] have to know that situation [in which] people are there...”. (Tanzanian male, 25)

The most critical pedagogical challenge concerned IT literacy: How to ensure that people will be ready for fully utilizing the new technology for learning purposes?

More than earlier studies on the same topic, our research brought out the experts’ view that due to the students’ preference to study in groups, group e-learning options should be investigated further. In our earlier research in Tanzania, we have noted that our students excelled in group work, but faced challenges in individual work [16]. Also interaction with teacher was considered extremely important. We agree with our interviewees that development of group work solutions is a topic well worth pursuing. And different from earlier research, our interviewees also brought up some legal concerns.

We finished the investigation by looking at how the present situation in e-learning and distance education should be improved in developing countries. Regarding this question, our interviewees arrived at a consensus that the development of e-learning is a multi-phased process, which takes a long time. In five out of seven interviews, the experts considered
that governmental support is very important in developing e-learning and distance education. In four out of seven interviews, the experts noted that learning e-learning is not an easy task, and that both teachers and learners need education and practice just for adopting the new educational paradigm. Teach training, equipment, finances, and strategic planning were considered to be important:

“For example lack of training. For example teacher training for distance education... Technological equipments for example. This is another thing. And also the connected with the financial problem. Because sometimes they have plans but they don’t have financial budget to implement this things. ... And also strategy plans”. (Tanzanian male)

Our interviewees were unanimous in their conviction that distance education would be utilized more if there were better resources. Firstly, technical infrastructure needs to be developed (4 out of 7 interviewees mentioned this aspect). Secondly, educational and pedagogical resources need an update (4 interviewees mentioned this aspect). Thirdly, Internet connections require an upgrade, too (3 interviewees mentioned this). Knowing the slowness and instability of the Internet connections in the institutions where our interviewees come from, we found it surprising that so few interviewees mentioned Internet connection upgrade as an important development step.

Our results suggest that support functions—such as pedagogical and technical support—are considered very important in development of e-learning and distance learning in developing countries. One of the interviewees proposed that development of e-learning capacity would be good to be organized as a long-term development project or a design research study. First, one should be aware of the state-of-the-art of e-learning in industrialized countries and the current state in developing countries. From there, it would be possible to take into account local students’ and teachers’ preferences concerning educational technology and modes of learning. Pilot courses could then be developed to test whether the designed modes of education work in the real setting.

Our interviewees, who are IT and education experts in a number of developing countries, considered it difficult for developing countries to develop distance education alone. Rather, they would like to see the development happen in collaboration between industrialized and developing countries. Developing countries’ experts know how to make things work in their own countries and cultures, and they are experts on locally working pedagogical solutions, on strengths and prospects in their home countries, and on challenges and pitfalls of ICT projects in their countries. Industrialized countries could bring their earlier experiences from their own solutions to this picture. Each of the participants should, however, prepare for a long and tedious process—which, in the end, could transform education altogether.

4. Conclusions

Our research results give an insight in the challenges of e-learning in developing world, especially Sub-Saharan Africa. The results support the literature in the sense that we found pedagogical, technical, and user environment-related challenges in application of web-based e-learning in developing countries; and similar challenges have been proposed in research literature, too.

In terms of pedagogy, the most important issue that has to be solved is teacher training for modern educational technology. For undertaking distance education projects, teachers need a large amount of information on the pedagogy of distance education and on using educational technology in a meaningful and effective way. Our results also suggest that virtual learning material has to be easily available. This means both the economical challenges of actually creating or obtaining the material, as well as making available a
virtual learning environment that is easy to use. Our research suggests that the willingness of students in our selected developing countries to engage in group work offers a pedagogical possibility to be utilized. Our findings also suggest that learning situations should include as much social interaction as possible, and that group work based models should be supported.

As the other studies on educational technology and ICT in developing countries have shown, basic technical infrastructure has to be sufficient in distance education, so that the possibilities of pedagogically functional information and communication technology can be taken advantage of. With this we mean ensured electricity, workable Internet connections, computers suitable for the local environment, and virtual learning materials that are relevant to each unique educational and sociocultural context. Our results confirm the findings of other research studies, that besides pedagogical and technological aspects, the environment of end users has to be taken into consideration. The environment of the end users consists of, for example, local environment, culture, and language.

Developing web-based distance education is not on a strong foundation if the environment where the operation is carried out is not taken into account well enough. Our interviewees suggested that improving distance education in developing countries might not work only with the contribution of people from industrial countries, nor only with the work of people from developing countries. The co-operation of international and national experts is needed. Our study offers new qualitative results on the e-learning and development phenomenon. It is obvious that more contextually relevant studies are needed to overcome the local pedagogical, technical, and user environment-related challenges.

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